Objective
Background of the research

Photosynthetic organisms constantly face the challenge of acclimatizing to changes in their light environment. Both the intensity of light that is available and its spectral quality may undergo abrupt variations depending on external factors such as the time of day, weather, and shading from other plants. In low light conditions, light capture and photochemistry need to be optimized. Conversely in excess light, photon capture is minimized, mechanisms of energy dissipation are activated, protection against reactive oxygen species is enhanced and repair of photo-damage is stimulated.

Chlorophyll is an intrinsic constituent in many components of the photosynthetic machinery, and its fluorescent properties make it an excellent biophysical probe of the photosynthetic electron transfer chain. Thus historically several aspects of the regulation of photosynthesis in response to changing light were monitored through changes in chlorophyll fluorescence. Regulation of chromatic acclimatization, also involve structural reorganization within membrane architecture leading to extensive light-dependent reorganizations of PSII-LHCII assembly (Kirchoff et al. 2011).

The structural dynamicity that facilitates the transition between the light-harvesting and photo-protective states of the thylakoid membrane has been of immense interest for many researchers. These studies are usually carried out under specified conditions like State I/State II transitions or under conditions promoting ΔpH dependent quenching and photo-inhibition (Chuartzman et al. 2008, Johnson et al. 2011, Chow et al. 2005, Yamamoto et al. 2014, Michel Goldschmidt-Clermont and Roberto Bassi 2015).

Also light induced electron transport causes acidification of thylakoid lumen and eventually the generation of trans-thylakoid ΔpH that is formed must be an important determinant for both photosynthetic light harvest and photo-protection. The first evidence that the light-driven formation of ΔpH had a structural effect on the thylakoid membrane came from the work by Murakami and Packer (1970a, 1970b) and thereafter extensive research in this field have been executed (Ruban et al., 1997, 2002, 2007; Bode et al., 2009; Ilioia et al., 2011, Bilger and Björkman, 1994; Miloslavina et al., 2008; Holzwarth et al., 2009, Johnson and Ruban, 2009; Johnson et al., 2009). Thus the irradiance induced trans-thylakoid ΔpH must also determine the chromatic adaptation and the corresponding macroscopic reorganizations under continuous irradiance of white light.
Objective

The flexibility of chromatic adaptation are however less addressed under conditions of continuous white light irradiance much like mimicking natural day light conditions. The present work is to study the photosynthetic light harvest and thylakoid membrane remodeling under continuous irradiance of white light and elucidate the factors determining the above mentioned phenomena, in thylakoids of *Arachis hypogaea*, an important semi-arid crop legume. Thus the objectives are set accordingly as-

- To assess the 77 K chlorophyll fluorescence under continuous white light irradiance and unravel the factors that determines the chromatic adaptation under continuous white light.

- To investigate the macroscopic reorganizations within stacking arrangements in thylakoids under identical conditions

- To check the factors that determine the stacking pattern of thylakoids when exposed to continuous white light and

- To determine a relationship between the stacking arrangements and 77 K chlorophyll fluorescence analysis of photosynthetic light harvest following continuous white light treatment.